STATUS REPORT BY THE FEDERAL REPUBLIC OF GERMANY

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It is my privilege to present the German government's status report this year too.
On January 1st, 2000, the number of passenger cars in the Federal Republic of Germany was 42,423,254. This was an increase of 1.7% per cent compared with the previous year. For the year 2010, the German Shell corporation has forecast a passenger car inventory of 47.6 – 48.4 million, in accordance with two different scenarios of economic development. In 1999, the average volume of traffic on highways was 48,500 vehicles every 24 hours. The total distance covered by all automobiles in 1998 was 627.2 billion kilometers, 194.2 billion having been traveled on highways and 110.7 billion kilometers having been traveled on main roads outside municipal areas.

Road Construction and Traffic Engineering

In 1999, nearly half of the total distance covered by automobile traffic (49.1%) on German roads was assignable to interstate roads. The proportion of the distance covered on highways is especially high: although highways only comprise roughly 1.8% of the total road network in terms of length, more than 31% of the distance covered by automobile traffic can be assigned to this type of road. Developments over a period of several years have shown that the total distance covered by traffic on highways is steadily increasing.
The fourth amendment to the Interstate Road Extension Bill containing the requirement plan for extending interstate roads 1992, passed by the German parliament in 1993 on the basis of the Federal Traffic Route Plan, foresees an investment volume of approximately 210 billion DM for urgent projects intended for the extension and new construction of road networks up to the year 2012. An additional investment program for the future was also approved, which foresees a further 67.4 billion DM for the period between 1999 and 2002. There is an intention to continue this investment program until 2003. Furthermore, bottlenecks in traffic links are to be eliminated systematically as part of an anti-congestion program beginning in 2003.
An increase in the traffic-handling capacity of roads is achieved predominantly through the addition of traffic lanes. Enhancing this capacity also improves the quality of traffic flow. As of January 1st, 1999, road stretches comprising six or more lanes have already made up more than 17% (1947 km) of the entire highway network. At present, an extension to six or more traffic lanes is planned for 2600 km (20%) of the entire network.
Also, as part of the traffic projects titled German Unity, Road to Extension, an expansion of a modern infrastructure is being continued on-schedule and will essentially be completed by 2005.
Traffic management systems are being employed to further increase capacity and improve traffic safety. Reacting to variations in traffic flow, these systems are used to adjust vehicle speeds to currently prevailing traffic and weather conditions. If required, traffic lanes are blocked or released for usage. A traffic-signal system meant for controlling highway-access lanes and investigated as a prototype for improving traffic flow supplied very positive results. For further applications, a reference paper was prepared which takes into account empirical data obtained during operation of the pilot system. For the further extension of traffic management systems, the Federal Ministry of Traffic, Civil Engineering and Housing (BMVBW) has updated the program for traffic management on highways for the period between 1996 and 2001. At the beginning of the year 2000, roughly 800 kilometers of highway were equipped with traffic management systems. This length is to be increased to 1100 kilometers by the end of 2001. Over roughly 2000 kilometers of highway, recommended detours are displayed by means of alternate signposts. An additional 100 kilometers are to be equipped with this facility by the end of 2001. The estimated costs for the program interval between 1996 and 2001 amounted to 600 million DM.
Building sites on federal highways are necessary for material upkeep and route extension. To operate these sites profitably, in a manner compatible with traffic, and - above all – safely, is seen as one of the challenges in future. In 1999, the operational stretches of highways had approximately 700 building sites with a service duration of more than two weeks (considered long-term building sites, supplemented by another 30,000 building sites of a shorter service duration annually). The long-term building sites had an average length of approximately 3.0 kilometers and an average service duration of approximately 126 days. In 1999, these sites had a total length of roughly 2100 kilometers. From January to December, these stretches comprised an average of roughly 5.8% of the entire highway network.
Since 1997, the Federal Ministry of Traffic, Civil Engineering and Housing has offered an Internet service for providing car drivers with information on highway building sites. This system allows car drivers

to obtain specific information on potential bottlenecks in the highway network before setting off on their journey and - if necessary - select alternative routes.
A high significance is attached to urban bypasses for the purpose of increasing the traffic safety and traffic-handling capacity of road networks. In 1998, 42 urban bypasses with a total length of 160.4 kilometers were opened to traffic. In the same year, a total of approximately 856.1 million DM were invested in the construction of urban bypasses. As part of a future investment program, 2.7 billion DM have been made available for the construction of 125 new urban bypasses. The construction of cycling lanes along interstate roads constitutes another effort to increase not only the safety of traffic but also its compatibility with the environment. Between 1981 and 1999, about 6,700 kilometers of cycling lanes were built at a cost of roughly 2 billion DM.
In addition, level crossings are being removed in order to eliminate safety pitfalls and improve traffic flow on main roads. 10 level crossings were removed in 1998, while another eight were under construction in the same year.
Furthermore, route-specific measures - for instance, to provide safe and controlled overtaking options, prohibit overtaking where required and enforce speed limits - as well as measures for safe design of peripheral zones around roads are being implemented to improve traffic safety on roads outside municipal areas.
The passive safety equipment in use for several decades in Germany to improve traffic safety has proven a lasting success. In certain special areas, it has been possible to make further improvements. This includes the development of safety features which not only continue to perform their function of stopping passenger cars and trucks, but also exhibit noticeably better - i.e. harm reducing - properties when it comes to impact suffered by motorcyclists. This applies to direct impact as well as sliding impact by fallen motorcyclists. This new safety equipment has already been installed on an experimental route in Hessen.
Bridges constitute another area where particularly dangerous spots are to be furnished in future with higher safety levels than has been possible so far. Whereas safety equipment on bridges generally possesses a high stopping capacity, bridges over zones requiring an especially high level of safety – that is, where third parties are endangered (for example, above high-speed railway lines) - need a correspondingly high stopping capacity sufficient to retain even trucks with a load of up to 38 t. This objective is currently being analyzed as part of a research project.
As a consequence of European harmonization, the German sets of rules concerning vehicle retention systems are also being revised. A draft for the "Guidelines for Achieving Passive Safety on Roads with Vehicle Retention Systems" is to be completed soon. However, the effects of the reviewed guidelines can already be observed in practice, for instance, through the increased use of impact absorbers for protecting the occupants of passenger cars against collision with solid obstructions.
In order to mitigate the effects of road traffic on the environment, among other things, an increasing number of roads are being built through tunnels in Germany. The number of tunnels in the German road network doubles approximately every 10 years. The average tunnel length is also increasing. To maintain the traffic handling capabilities of tunneled routes even under heavy traffic load, more attention needs to be paid to tunnel lighting than has been the case so far. There is a need for lighting equipment which will ensure a smooth flow of traffic while keeping driving behaviour as constant as possible, and providing high profitability at the same time. In view of the severe fire disasters which occurred in two road tunnels, it is necessary to develop new concepts of escape route identification and emergency fire lighting for road tunnels which will allow users of the tunnels to leave as quickly and safely as possible in the event of a catastrophe.
The specified requirements for tunnel lighting equipment will be incorporated into the relevant sets of rules - Guidelines for Equipping and Operating Road Tunnels (RABT), Supplementary Technical Contractual Terms, Guidelines for the Construction of Road Tunnels (ZTV tunnels) as well as Lighting of Road Tunnels and Underpasses (DIN 67 524).
The Federal Ministry of Traffic, Civil Engineering and Housing is supporting the preparation of road-category-related guidelines (guidelines for highways, rural roads, municipal roads). These new guidelines are intended to help achieve a homogeneous design of roads in accordance with their function and thus contribute toward an increase in traffic safety. Activities to prepare a standardized procedure of checking traffic-safety-related aspects of road plans (safety auditing) are also being supported.
Small, single-lane roundabouts have proven successful in Germany in far more than 1,000 application cases. At present, roundabouts with a wide, circular carriageway without traffic-lane markings are being tested with the objective of increasing the capacity of this type of node. The wide, circular carriageway is intended to allow a side-by-side flow of passenger-car traffic, while preventing an overtaking of trucks. A recommendation for the areas of application and structural design of such roundabouts is currently being prepared.
For quite some time now, the Federal Republic of

Germany has pursued the objective of reducing the number of traffic signs, the reason for this being that Germany has one of the highest densities of traffic signs in the world. Excessive signalization in road traffic can easily overtax road users and distract their attention from the traffic situation. In order to mitigate these effects in future, the road traffic regulations (StVO) and related administrative rules have been extended to minimize the number of traffic signs to the absolutely necessary amount.
To consolidate this general specification, a working group comprising representatives from the federal government and various state ministries, and designated "Fewer traffic signs, better signalization" has been appointed. This working group has now revised the paragraphs of the road traffic regulations and related administrative rules dealing with signalization. It pursued the objective of reducing the number of traffic signs and - in particular - ensuring that they are used sparingly, in addition to improving the signalization still required, and making this signalization more understandable for road users.
The recommendations made by the working group had to be oriented toward general conditions specified by existing international agreements, which restrict the possibilities of reducing the number of traffic signs in road traffic regulations. In addition to specific recommendations in individual cases, the administrative rules which have so far resulted in double signposting have been revised in particular. Furthermore, the working group attached more importance to the systematic configuration and re-arrangement of traffic signs for stationary traffic, and opened up possibilities of surface markings. The relative clauses of the administrative rules were streamlined notably and standardized in terms of expression. The recommendations made by the working group are presently the subject of technical discussion; the new guidelines are expected to be introduced before the end of 2001.

Automotive Engineering

As regards regulations and specifications for assembling vehicles, an important contribution toward traffic safety and environmental protection has been made by integrating international regulations into national legislation. Examples here include work performed as a member of the UN Economic Commission for Europe (ECE) and as a member of the European Union (EU).
Since 1953, the UN-ECE's vehicle assembly working group has prepared more than 100 regulations governing the approval of vehicles, vehicle systems and vehicle components.
In 1998, an agreement was drafted (parallel to the agreement of 1958) to allow an international harmonization of regulations governing vehicle approval. This agreement was prepared by the USA, Japan and European Union, and is intended to serve as a bridge between the different vehicle approval systems (self-certification in the USA and type-approval procedure in Europe and Japan). This parallel agreement was signed by Germany on 11.05.2000.
In the context of national and international guidelines concerning environmental and climate protection, note must be made of the European exhaust-emission legislation for the limited pollutants HC, CO, NO_X and particles. The limiting values for exhaust gases have been made more stringent in steps during the last few years. For passenger cars and light commercial vehicles, the Euro-3 and Euro-4 steps come into effect in 2000 and 2005 respectively. As regards engines for heavy commercial vehicles, a further tightening of limits is planned in 2008.
In spite of an increase in mileage forecast particularly for commercial vehicles, the introduction of these new vehicles to the market and a step-by-step establishment of this inventory will lead to considerable reductions in the limited emissions of road traffic in Germany.
The reduction in emission levels is also a consequence of improved fuel quality. In compliance with EC guideline 98/70/EC, the maximum sulfur content of fuels is to be lowered to 50 ppm from 2005 onwards. Such fuels are termed low-sulfur fuels. In Germany, low-sulfur fuels will receive tax relief from 1st November 2001 onwards. Even a value of 50 ppm is still too high for modern, fuel-saving internal combustion engines with direct fuel injection, in conjunction with more sophisticated exhaust-gas treatment technology. Without sulfur-free fuels (maximum 10 ppm), it is not possible to fully exploit the potential for reducing fuel consumption. For this reason, tax relief for sulfur-free fuels is planned in Germany from January 1st, 2003 onwards. Germany has submitted a memorandum to the EU commission calling for the introduction of sulfur-free fuels: By updating the EC guidelines governing the quality of fuels, sulfur-free fuel should be specified as mandatory in the European Union. In the case of CO_2, European automobile manufacturers have unilaterally committed themselves to a reduction in emission levels. Average CO_2 emission levels of newly registered passenger cars are to be reduced to 140 g / km by 2008. The progress made by this unilateral obligation is "monitored". As part of this monitoring, the member nations are supposed to submit the fuel consumption data of newly registered passenger cars to the European committees at regular intervals.
In this context, note must also be made of the guideline for consumer information on fuel consumption and CO_2 emissions during the marketing

of new passenger cars (1999/94/EC), dated December 13th, 1999. In accordance with this guideline, manufacturers and dealers are obliged to make corresponding data concerning the offered types of vehicle available to customers. In particular, the member nations must, among other things, ensure that the sale of every new passenger car must be accompanied by references to the fuel consumption to the effect that the consumption levels and CO_2 emission levels of all vehicles offered at point of sale are listed in a notice, and that all advertisements contain details on the fuel consumption levels and specific CO_2 emissions. A guide on fuel consumption and CO_2 emissions must also be prepared annually.
EU guideline 96/96/EC describes the technical monitoring of vehicles and vehicle trailers in the EU member nations. This guideline specifies the time intervals at which technical tests are to be performed, as well as the extent of these tests. In Germany, the guideline for performing safety tests in accordance with §29 StVZO dated December 12th, 1999 has been revised. The intermediate test and special brake test applicable so far to commercial vehicles have been dispensed with. The aspects covered by these tests have been grouped together and integrated into the safety test.

Accident Statistics

The number of road accidents in Germany increased from 1997 by approximately 8% to about 2.4 million in 1999. The number of accidents involving injuries to people increased less sharply by about 3.9% to approximately 396,000. This was accompanied by a mileage increase of 3.4% to approximately 639 billion vehicle kilometers.
The number of people killed in road accidents decreased from 8,549 in 1997 to 7,792 (1998) to 7,772 in 1999, the lowest figure since 1953. 5,249 occupants of passenger cars were killed in 1997; this number decreased to 4,741 in 1998 and 4,640 in 1999. Accordingly, approximately 60% all people killed in road accidents are occupants of passenger cars.
With a proportion of approximately 64%, most accidents involving injuries to people occur in municipal areas; the proportion of deaths in this case is considerably lower at 24%. In contrast, the proportion of accidents involving injuries to people on rural roads is considerably lower at approximately 30%, although the death rate of roughly 65% is quite high. About 6.5% of all accidents involving injuries to people take place on highways; this is where roughly 12% of the total number of road traffic deaths are counted.

Accident Research

For many years now, the Federal Ministry of Education and Research has sponsored research and development projects for improving safety in road traffic. In view of the steadily increasing distances being covered by road traffic, the sponsorship of such research projects is seen as a continuous responsibility and challenge.
Whereas in the past, the transport of hazardous goods on roads constituted a key issue of supply - reports of this have already been provided in previous ESV conferences - basic research and development of telematics systems for traffic have comprised an essential aspect of safety research of late, and continue to do so.
The development and testing of modern sensing and control systems, data acquisition systems as well as communication, control and information technologies allow a compensation of deficits in traffic management and a supply of current, complete information to road users. This will, in future, make it possible to identify and avoid critical situations in traffic already as they emerge, by supplying drivers with corresponding forecasts and/or actively supporting them. This can reduce the danger of accidents considerably.
In this context, the Federal Ministry of Education and Research has funded the PROMETHEUS and BEVEI projects, as well as the MoTiV program completed in the middle of last year, with approximately 200 million DM. With MoTiV, the German automobile and electronics industry, in cooperation with providers of traffic services and assisted by the Federal Ministry of Education and Research, has implemented a broad-based, joint program to improve mobility in conurbations and increase traffic safety.
MoTiV was used to conduct practical research projects based on fundamental research carried out as part of the predecessor program PROMETHEUS. Basic systems were developed and tested successfully in demonstration vehicles which actively assist drivers in the selection of distance and speed when following other vehicles (adaptive cruise control - ACC), warn them about potential conflicts with other road users when changing lanes and taking turns (turning and lane-changing assistance -ASA); in addition, voice recognition techniques were developed which operate reliably under the special boundary conditions prevailing in automobiles, and are equipped for future applications such as navigation, telematics and Internet (man-machine interaction – MMI). The legal and ergonomic aspects of various degrees of automation in vehicle guidance were also analyzed in depth in order to obtain findings concerning the possibilities and limitations of automating tasks.
The activities described for improving active safety are being supplemented and extended in the ongoing project network titled "Safe roads". The focal points in

this network presently are research activities to allow better identification and protection of weak road users. This also involves an investigation of the extent to which such users can contribute toward their own safety with a minimum of effort (VESUV). Another project is investigating the forms in which assistance systems can ideally support drivers, and, in particular, how to avoid overstress and boredom in such cases (SANTOS, EMPHASIS).
Improved protection against rear-end collisions through timely warnings concerning trailing traffic is being investigated in the WARN project which makes use of corresponding, preliminary investigations from MoTiV. Another approach toward improving traffic safety is seen in the traffic education of young road users while they are at elementary school. For this purpose, an interactive training program was developed to prepare this age group for active participation in road traffic with the bicycle (RMS).
The activities described within the scope of "Safe Roads" are to be supplemented by the new system titled "Driver Assistance for Increased Safety" on the road. Advanced systems for anticipatory, active safety at crossings, during evasive maneuvers and lane-changing, as well as traffic-jam assistance - i.e. in the problematic, low-speed range right down to a standstill are to be developed and tested here. In addition, a Franco-German cooperative project (DEUFRAKO) is intended to evaluate the approaches developed in the WARN project for vehicle-to-vehicle communications (Inter-Vehicle-Hazard-Warning – IVHW) and prepare them for use on a European platform. Since 1998, the Federal Ministry of Traffic, Civil Engineering and Housing has continued its diverse research efforts; the Federal Highway Research Institute (BASt) has played a major role in this process. Automotive activities were concentrated mainly on the issues of the vehicle safety and environmental protection described in the following.

Passive Vehicle Safety

Surveys at accident sites were continued. The evaluations performed with the acquired data in recent years include:

- Compatibility of passenger cars
- Collision of motorcycles with lateral obstructions and passive safety equipment
- Analysis of head-impact points of the occupants of passenger cars in the interior
- Injuries suffered by the occupants of passenger cars as a function of airbag deployment
- Collisions in peripheral zones around roads
- Detailed analysis of accidents involving children in passenger cars as part of the CREST EU project
- Evaluation of collisions between passenger cars and pedestrians (cooperation between EEVC and IHRA)

Use was also made of surveys covering the following issues:

- Development of future, national and international guidelines and legislation
- Dependence on accident severity and design of peripheral zones around roads
- Identification of future potentials for safety equipment in passenger cars
- Comparability between crash tests and actual accidents
- The effect of existing legislation and guidelines on the safety of vehicles
- Validation of computer models

Since the middle of 1999, the Federal Highway Research Institute has built up a second survey team in Dresden, in cooperation with the German automobile industry. Nearly 1,000 accidents per year are being surveyed here at present, by means of the same technique used at the Medical University of Hanover. A joint evaluation of both databases will take place for the first time in 2001. Possible topics addressed by this evaluation are:

- Determination of the potential for reducing the number of road traffic accidents involving severe injuries and deaths
- Angle and speed of collision between vehicles and road components, for the purpose of standardizing collision tests
- Multiple collisions of passenger cars

In addition to the surveys performed in Hanover and Dresden, two further locations have been established in the meantime, where detailed surveys of road accident data are conducted.
In Mecklenburg-Vorpommern, accidents involving severe injuries are documented by the University of Greifswald using a technique similar to that employed in Hanover and Dresden; sponsors of this project include the General Organization of Commercial Professional Associations, the Steinbeis Foundation for the Promotion of Research and the FAT. In Berlin, the Ford Research Center gathers extensive data concerning collisions between passenger cars and pedestrians. Both these projects are supported by the Federal Highway Research Institute. In addition, several German automobile manufacturers have conducted their own research in this area for a number of years now.
On behalf of the Federal Ministry of Traffic, Civil Engineering and Housing, the Federal Highway Research Institute is engaged mainly in collaboration with the presently active EEVC working groups. A detailed report on the status of these activities will be presented elsewhere during this conference.
To continue development of the lateral dummy (EEVC

WG 12) the Federal Highway Research Institute has investigated interaction between leg impact and the forces measured in the pelvis. New modules - particularly the thorax – were investigated in slide tests. The results of these investigations are also considered in the activities of the IHRA and the development of the WORLDSID.
The investigations for revising the legal requirements concerning side impact (EEVC WG 13) have not yet been completed as regards head impact in the vehicle interior. During lateral collisions, the occupants of passenger cars suffer head injuries particularly often. For further practical applications, the side-impact tests prepared by the EEVC are therefore an extension of the test method already specified in the USA. This test method is recognized as goal oriented, although fastened seat belts are assumed for the impact areas yet to be specified, due to the high rates of seat belt usage in Europe.
In the past, it has turned out that different deformation elements manufactured in accordance with the action guidelines prepared by the EEVC for the side impact test (ECE R. 95) result in different objectives concerning the development of lateral structures for passenger cars. In an extensive series of tests involving the participation of several international institutions, deformation elements supplied by 8 manufacturers were exposed to various loads in impact tests. The conclusions drawn from these tests will be used to prepare guidelines for constructing deformation elements to be used in side-impact tests.
A project sponsored by the EU commission and headed by the Federal Highway Research Institute for investigating compatibility between passenger cars in accidents (EEVC WG 15) was completed in 1999. Using modified as well as unmodified vehicles, the Federal Highway Research Institute investigated the influence of a homogeneous rigidity of front structures. During this exploratory investigation, various approaches were taken in close cooperation with the NHTSA. Incompatibilities of vehicle structures were frequently observed, although a correlation between injuries suffered by vehicle occupants and dummy measurement values was extremely difficult. The activities of the EEVC WG 15 comprise a significant contribution to the activities of the IHRA Compatibility Working group. An evaluation of compatibility by means of additional criteria in the various test methods specified on an international scale seems possible. After additional test programs in 2001, a two-year research project sponsored by the EU commission is to be commenced in 2002 in order to design a procedure for evaluating the compatibility of passenger cars in accidents.
The EU commission has drafted a guideline on the basis of the test method developed by the EEVC (WG 10) for protecting pedestrians during accidents with passenger cars. Following objections submitted in particular by the automobile industry, the test method and test objects were revised (EEVC WG 17). The activities of this working group will also be considered in consultations of the IHRA Pedestrian Protection working group. Efforts are being made to prepare standardized test methods on a European level, in close co-operation between the EU commission, automobile industry, and the institutions participating in the activities of EEVC WG 10 and 17.
On behalf of the Federal Highway Research Institute, a project was implemented to investigate the potentials of improving modern serial automobiles in terms of pedestrian safety, while making as few changes as possible to the outer design of the vehicle. Minor changes, for instance, to the bumper, hood mountings and hood itself resulted in notably lower risks for pedestrians. Furthermore, notes during the practical application of the test in accordance with EEVC WG 17 were gathered, and will be considered in future deliberations related to this issue.
In 1999 and 2000, the General Association of German Insurance Companies performed intensive evaluations of pedestrian-related data (1200 accidents). An observation of the impact regions showed that the most severe injuries to pedestrians clearly occur during frontal accidents, although lateral collisions must not be underestimated either. Elderly pedestrians were involved in accidents more often than average: every second fatally injured pedestrian was aged 60 years or more. This indicates the tremendous influence of age (higher vulnerability of older people to injury), which must, on no account, be neglected during evaluations of pedestrian-related data or future procedures of testing pedestrian safety.
By far the most severe injuries in all age groups result from head impact at the rear of the hood, including the windshield, its frame, and the A-post. Injuries suffered by children and adults exhibit completely different impact characteristics; to achieve an effective reduction in injuries to pedestrians, the requirements of children as well as adults must therefore be considered. These results were incorporated into efforts to harmonize crash test programs and presented at safety conferences. From the perspective of the insurance trade, a much more intensive international comparison of results of accident research will be required in future, in order to establish the effective measures required for improving pedestrian safety on a wide scale.
The investigations of accidents involving vehicles equipped with air bags, commenced by the General Association of German Insurance Companies in the 1990s, were intensified again in 1999/2000 through the accumulation of new accident-related material. The

activities performed in conjunction with this form part of a research project initiated by the Federal Highway Research Institute and conducted jointly by the German Automobile Club as well as the General Association of German Insurance Companies. At the end of the year 2000, data on approximately 750 accidents involving vehicles equipped with air bags was available; this data will now undergo in-depth medical and technical analyses. The research report for the Federal Highway Research Institute - expected to be ready by the end of 2001 - will also contain information on the protective function of lateral air bags.

In Europe, child restraint systems are examined in compliance with ECE regulation 44 during frontal-impact tests. Side impact has not been covered yet by the regulations. As part of a research project, the Technical University of Berlin is currently developing a lateral test method as an extension to regulation 44. In a further project, potential hazards posed by lateral air bags to children in child restraint systems are being investigated. The findings obtained will be used to make recommendations and improve existing regulations. The Federal Highway Research Institute is participating in the development of a new generation of child dummies, which can be used in frontal-impact and lateral-impact tests. The Federal Highway Research Institute is also a participant of the CREST (Child Restraint Systems for Cars) research group sponsored by the European Commission. This research consortium is focusing its investigations on the vulnerability of children in restraint systems to neck injuries.

A variety of aid agencies offer transport for wheelchair users. For this purpose, use is made of transport vans for handicapped people; during journeys in such vans, the handicapped people remain seated in their wheelchairs. Safe restraint systems allow safe transport and thus enhance the participation of handicapped people in society. The activities of the Federal Highway Research Institute have contributed significantly toward completing the revision of the technical regulations (DIN Standard 75 078 Part 2 "Restraint Systems for Transport Vans for Handicapped People").

On behalf of the German government, the Federal Highway Research Institute is participating in EuroNCAP. At the beginning of 2001, the crash test facility of the Federal Highway Research Institute was certified as a test laboratory by EuroNCAP. A research institute is currently investigating the effects which valid EU guidelines and - in particular - the Euro-NCAP testing and analysis procedure have on real accident situations. Due to the complexity of this issue and diversity of possible investigative approaches, the project is divided into several phases: Phase I: Objective determination and feasibility study; Phase II: Empirical investigations and evaluations. Activities forming part of Phase I are to be completed in 2001.

In the past, the Institute of Vehicle Safety of the General Association of German Insurance Companies has performed a detailed analysis of seven different procedures of rating the safety of motor vehicles. This investigation showed that these procedures - all of which are based on an evaluation of real accidents - supply widely differing results. For this reason, the different methods and types of data acquisition in each procedure not only provide different sets of results, but also generate uncertainty in public opinion.

With the objective of analyzing the reliability of retrospective techniques and defining quality criteria, the Institute of Vehicle Safety initiated an international research project in which renowned experts from all over the world are participating. Headed by the CEA, scientists from leading American, Australian, Japanese and European accident research centers, as well as automobile manufacturers and insurance companies are working together in this project. The foundation stone for the SARAC (Safety Rating Advisory Committee) project - sponsored to nearly 50% by the EU, DG VII was laid in May, 1999. A summary and description of different rating procedures has been available as a report since the end of 2000.

In municipal areas, the vulnerability of unprotected road users to right-turning trucks poses a major problem. In the majority of such cases, the unprotected road users are killed. As a result, it is now mandatory to equip trucks with lateral under-run protection. In addition to equipment for avoiding over-running, the furnishing of vehicles with improved mirror systems, video systems as well as sensors for localizing obstructions and people is being promoted. An extensive research project is currently being sponsored to avoid the described accidents and mitigate the consequences.

To improve the passive safety of coaches, several tightened EC guidelines have been incorporated into national regulations. Accordingly, since June 1st, 1998, new types of coaches and combined buses weighing more than 3.5 t, and since October 1st 1999, all coaches and combined buses weighing more than 3.5 t need to be equipped with safety belts and improved passenger seats.

In the area of motorcycle safety, three fatal accidents - in each of which the rider had been thrown off as a result of panicky braking - provided an occasion to intensively investigate the motorcycle database of the General Association of German Insurance Companies from the perspective of this problem. The analysis showed that in 20% of cases in which any type of braking is performed, the motorcyclist is thrown off, and that 93% of these crashes could be avoided by

equipping motorcycles with ABS. According to estimates by the General Association of German Insurance Companies, the number of killed and injured motorcyclists could be reduced by at least 10% through the installation of ABS; applied to the Federal Republic of Germany, this would mean an annual decrease by 90 deaths and 3000 injuries. In view of these findings, the accident researchers of the General Association of German Insurance Companies have called for equipping motorcycles in future with ABS as a standard feature, wherever possible.
Following the Bavarian government's permission to evaluate all truck accidents in Bavaria involving severe injuries, the Institute of Vehicle Safety of the General Association of German Insurance Companies had a special evaluation performed by the Bavarian State Agency for Statistics and Data Processing. This project consisted of a survey and evaluation of a total of approximately 1,000 traffic accidents occurring in Bavaria in 1997, and involving trucks as well as least one severely injured person in each case. This complete survey supplied the General Association of German Insurance Companies with extremely useful truck-accident information which is also compatible with a previous truck investigation titled "Truck Accidents in Bavaria in 1984", thus allowing comparative studies of accident development of a period of 13 years. Initial analyses have revealed a tremendous potential for improvement as regards active as well as passive safety of trucks. For example, electronic braking systems, distance controllers, ESP, reflective contour markings, optimized mirror systems and reversing cameras can preclude a large number of accidents. Passive safety could also be increased notably through more rigid driver cabs, an increase in the usage of seat belts as well as improved under-run systems at the front, sides and rear.
Traffic accidents involving severe injuries or fatalities to the occupants of public-service buses and coaches are rare occurrences compared with accidents involving other modes of transport. Nevertheless, accidents of this type - particularly severe ones - attract especially high public attention. Similar to the truck-accident study, the General Association of German Insurance Companies performed an analysis of all omnibus accidents occurring in Bavaria in 1998 and involving injuries to people. Covering 949 cases, this analysis supplies representative material concerning bus accidents, which can be used as a basis for investigating further possibilities of accident reduction. The objective of the accident investigation project is to update the status of safety research in order to allow a better identification of the causes and circumstances of bus accidents, and reduce consequential damage through specific measures.
The EU appointed the General Association of German Insurance Companies to prepare a framework for increased bus safety as part of the EU project titled "Enhanced Coach and Bus Occupant Safety (ECBOS)". In cooperation with an international research team, the operative tasks were commenced at the beginning of 2000. The primary objective of this 3-year project is to further increase bus safety. In this context, the General Association of German Insurance Companies has essentially assumed the responsibility of analyzing accidents involving service buses and coaches in terms of structure and cause.
Following a declaration of the necessity of a dynamic test for vehicle seats (for manufacturer and consumer tests), the General Association of German Insurance Companies - in cooperation with the ETH Zurich and an automotive supplier - developed a dynamic test standard, which has formed the basis for numerous experiments in the past. The tests showed that improved seat design can significantly reduce injuries and raise corresponding threshold values. Although certain parameters still require additional, basic research, the General Association of German Insurance Companies is convinced that the test standard provides a basis for efficient seat improvement. This standard was submitted in autumn 1999 to the ISO, approved there, and will constitute a basis for seat testing in future.

Active Vehicle Safety

Since October 1998, specially marked passenger-car trains can travel at speeds of up to 100 km/h on highways and main roads under certain conditions, in accordance with the 9th exception clause of the StVZO.
The traction vehicles must not weigh more than 3,500 kg, and must be equipped with ABS.
The weight of the trailer must not exceed X times the dead weight of the traction vehicle; the following values are specified:

- For trailers without brakes, and trailers with brakes but without vibration dampers, X = 0.3
- For caravans with brakes and vibrations dampers, X = 0.8
- For other trailers with brakes and vibration dampers, X = 1.1

The tyres of the trailers must not be older than six years, must at least comply with speed category L (120 km/h), and have a sufficient load index for a speed of 100 km/h.
As these criteria are quite restrictive due to safety factors, a relatively low number of passenger-car trains have benefited from them so far. Official accident statistics were used to check the conspicuousness of these trains in accidents. Related, evaluated data for 1999 are now available. According to these data, there

has been no significant deterioration so far.
The use of sway stabilizers improves the driving characteristics of a passenger-car train, although their intended purpose remains dubious (absence of grease, moisture). To allow more passenger-car trains to benefit from this regulation than has been the case so far, a possible increase in the weight ratios should therefore only be discussed after a check of official accident statistics for the year 2000.
As regards additional fuel consumption: Caravan trains will probably also exploit the speed limit of 100 km/h on highways. The additional fuel consumption between 80 and 100 km/h will then amount to roughly 3 l / 100 km (constant speed on a level plane).

The wearing of safety helmets impairs the head's freedom of movement as well as the field of vision for motorcycle riders. In the case of many motorcycles, it has been established that the conventional, rear-view mirrors presently in use often provide an inadequate field of vision, and that motorcyclists need to briefly turn their head/body in order to reliably assess the traffic situation to the sides and the rear.
The lateral and rear fields of vision on a variety of motorcycles were determined in one of the research projects initiated by the Federal Highway Research Institute; influential parameters such as the position of the driver's seat and masking (through protective clothing) were also considered. These results were used as a basis for formulating proposals for improving the design and positioning of mirrors, as well as minimum specifications for mirror design in future. Different mirror positions and types - including aspherical mirrors - were investigated in terms of improvement potential on an experimental carrier. A further step consisted of developing a measurement technique which allows an investigation of visibility conditions on motorcycles using a reproducible test method. The practical feasibility of this method was checked using individual motorcycles as examples. This test method as well as the findings obtained from the previous work steps finally served as a basis for proposing changes to existing legislation.

During journeys in motor vehicles on roads wet by rainwater, mist can impair vision and thus increase the hazard level. For this reason, EU guideline 91/226/EEC specifies that certain classes of vehicle be equipped with defined splash-guard systems. The restrictive design regulations of this guideline prevent a development and use of new types of splash-guard systems.
Consequently, the Federal Highway Research Institute initiated a research project to investigate the splash and spray behaviour of commercial vehicles on a defined test stretch, and prepare recommendations for an action guideline.
A test method was proposed which allows a direct measurement of the effectiveness of wheel covers on vehicles. An investigation of different commercial vehicles using the new method revealed that this method allows an analysis of the generation of mist. The attenuation of a laser signal provided findings on the impairment of visibility by mist under precisely defined boundary conditions.

Under certain driving conditions, defective vibration dampers increase the dynamic wheel load, and can thus affect the braking performance as well as the performance of the vehicle on bends. Like all other important vehicle components, vibration dampers are also checked as part of the main inspection in accordance with § 29 StVZO. At present, this inspection essentially consists of a visual check whether the dampers exhibit any heavy oil loss and whether they are externally intact. The Federal Highway Research Institute supports activities toward replacing this subjective method of investigation by an objective test.

Technical defects on vehicles impair safety in road traffic. One possible reason for technical defects is incorrect or impermissible repair work performed on a vehicle after an accident.
One of the research projects initiated by the Federal Highway Research Institute is aimed at determining the risks posed to safety in road traffic by incorrectly performed repair work on vehicles heavily damaged in accidents.
An investigation of the potential hazards here is to help establish, in particular, whether a special technical check of vehicles heavily damaged in accidents - as performed in certain EU member nations - contribute to an increase in a road traffic safety before re-commissioning.
As already reported, various possibilities of application of an accident data recorder have been investigated in the Federal Republic of Germany, particularly in terms of the contribution such a data recorder can make to accident clarification as well as objective analysis of movements and events in the pre-crash phase. A modified variant of this device - the "travel data recorder" is currently being tested with regard to its accident prevention capabilities. For this purpose, travel data recorders have been built into the vehicles of approximately 800 young drivers. In a controlled field experiment, the preventive effect of the travel data recorder is to be investigated in terms of settings, aspects of driving behaviour and accidents situations (project titled "Travel Data Recorders and Young Drivers", initiated by the IVU). On a smaller scale, investigations are also being conducted to

establish the extent to which the information gathered by a travel data recorder is suitable for recording critical types of behaviour for the purpose of direct feedback to young drivers, so that the travel data recorder can be used systematically in the learning process of novice drivers (project titled "KRISIS", initiated by the DVR).
Heavy-duty trucks and semi-trailer trucks might in future be equipped with wide, single tyres on the drive axle.
A literature analysis was used to investigate the road behaviour and driving safety of heavy-duty commercial vehicles with different types of tyres in simulations based on an ADAMS computing model. For these tests, use was made of identical vehicles with twin tyres or wide, single tyres on the drive axle as well as the trailer and support axles. Driving experiments with different types of tyres on the drive axle were performed additionally for semi-trailer trucks. The following scenarios of practical relevance were investigated:

- Retention of the total width with changes to the track width in the case of the various tyre combinations
- Changes to the spring track, resulting in changes to the rigidity of the rocker spring, while maintaining the stabilizer dimensions
- Effects of a defective tyre on driving safety

The use of single tyres reduces weight. This firstly permits a higher payload and, secondly, reduces the non-sprung weight. This change implies more comfort and better road holding. Driving experiments and simulated calculations showed that changes in road behaviour and driving safety are essentially dependent on the properties of the tyres themselves. Wide, single tyres possess a higher lateral rigidity. This is made evident by an improved oversteering response, which is particularly advantageous in the case of vehicle combinations. Changes to the spring track on the drive axle do not have any influence on the tilting stability of truck trailers, but improve the tilting stability of single trucks.
According to the investigations, driving stability is not further impaired by defective tyres on the drive axle, if they comprise wide, single tyres.

The transport of motorcycles behind passenger cars is made possible by a towing device which is fastened to the towbar of the traction vehicle and which serves as a mounting for the front wheel of a motorcycle. This type of combination - consisting of the traction vehicle and towed motorcycle - is not permitted in road traffic in Germany. To clarify the automotive prerequisites for towing an operational motorcycle behind a vehicle spanning several lanes, the Federal Highway Research Institute is investigating the driving characteristics of such a road train at its Automotive test Facility. One of the tasks here is to establish the extent to which a towing device is suitable for ensuring safe transport of a motorcycle.

As part of conversion involving certification for two-wheeled and three-wheeled motor vehicles, the class of light vehicles has been newly introduced in the Federal Republic of Germany. These vehicles are characterized as four-wheeled vehicles with a dead weight of less than 350 kg, excluding battery weight in the case of electric cars, with a design-specific maximum speed of 45 km/h or less, and a cubic capacity of 50 cm^3 or less for external-ignition engines, or a rated power of 4 kW or less for other types of engine.
A class B driver's license is required to operate a light vehicle in Germany. These vehicles do not require registration and are not subject to technical control. On behalf of the Federal Ministry for Traffic, Civil Engineering and Housing, the Federal Highway Research Institute investigated the issue of whether or not such vehicles should undergo technical control. A survey of empirical data from other European nations where light vehicles or comparable vehicle classes have already existed for some time did not provide any clear results. Consequently, the Federal Highway Research Institute plans to clarify this issue by means of a research project, foreseeably in 2001. For this purpose, used, light vehicles of different ages and not subject to any technical control will be investigated as regards active and passive safety.
On behalf of the Federal Ministry for Traffic, Civil Engineering and Housing, the Federal Highway Research Institute is dealing on an inter-disciplinary level with a modern on-board information and communications systems - including driver assistance systems - from the point of view of automotive technology, traffic engineering and behavioural sciences.
Following extensive research and development, also as part of various European and national programs (PROMETHEUS, DRIVE, TAP), numerous traffic telematics systems ready for application are now pushing their way into the market. These telematics systems are designed to assist drivers in navigation and vehicle guidance. Another primary objective of theirs is to improve traffic safety. A distinction is made between systems which are intended to

- simply inform drivers
- warn drivers about hazards
- assist drivers in guidance and navigation
- warn drivers about possible driving errors
- prevent driving errors by directly overriding vehicle control

In addition to products integrated into the vehicle, a

large number of services has also arisen which support the vehicle systems through the acquisition and supply of traffic data, for example, during navigation.
To define and categorize the large number of systems individually in accordance with an equally large number of criteria would exceed reasonable scope; instead, the task of the public agencies is to analyze the systems particularly in terms of their compatibility with traffic-related political objectives. Primary objectives here include:

- Improvement of traffic safety
- Maintenance or even enhancement of the performance of road traffic systems
- Careful dealing with resources and the environment
- Accessibility of cities and regions

These aspects are influenced by the introduction and widespread use of telematics services and technologies. Essential factors during evaluations of the new systems are:

- Automobile assessment (licensing conditions, reliability, susceptibility to malfunction)
- Assessment from the perspective of driver behaviour (acceptance, driver responsibility, maintenance of driving competence)
- Traffic-related aspects

The advantages and disadvantages of automatically overriding speed selections by the drivers of vehicles were discussed at a European workshop organized by the Federal Highway Research institute in September 1999. Here, it was established that no legal basis yet exists for external, automatic overriding of vehicle control. Even for thinkable, mandatory installation (and voluntary use by the driver), there is still no scientific evidence that these systems are actually "beneficial".
Germany emphasized that one of the objectives of the workshop was - if possible - to not only transfer existing, static specifications to electronic media, but also include future-oriented, situation-related dynamic speed measurements into the considerations. From the German perspective, the last decision concerning man/machine interface systems should always be left to human beings.
Innovations for improving traffic flow and transport capacities were basically welcomed. However, substantial analyses of effect - particularly concerning man/machine interfaces - are required before the introduction of technical systems. These analyses deal with the expected effects of the complex system called "traffic" and, naturally, also take legal frameworks into consideration.

On 21st December, 1999, the European Commission published a recommendation to the member nations and industry concerning safe and efficient on-board information and communications systems: "European Catalogue of Principles Concerning Man-Machine Interfaces". By the beginning of 2002, the commission is to receive reports on the extent to which these principles have been adhered to in Germany.
The responsible parties, such as the automobile and supplier industry, have been urged to observe this recommendation and present the Federal Highway Research Institute - which has been charged with scientific coverage of this topic – with reports concerning empirical data gathered during implementation, as well as measures taken for adherence to these principles.
In this connection, an initial workshop was held by the Federal Highway Research Institute on September 7th, 2000. As part of this event, a first exchange of views concerning implementation of the recommendation took place with the participants, and future, common strategies were agreed on.

Motivated by the steady increase in traffic volume and the accompanying rise in requirements which need to be met by drivers, automatic vehicle control systems have undergone rapid development in recent years. Development objectives for such driver assistance systems include an increase in the safety and performance of road traffic, as well as the level of driving comfort. Not only fully automatic driving as such, but also the various intermediate stages leading up to this situation must be taken into account when considering automatic vehicle control systems. A distinction can be made between the following stages here: warning and information, binding instructions, corrective intervention, overriding of manual control.
In a research project initiated by the Federal Highway Research Institute, the various systems were analyzed at the mentioned levels of driver assistance, the effects of system failure were investigated, and related conclusions were drawn for the development of such systems. The effects of these systems on the performance of traffic facilities were also investigated. In addition, legal problems related to this topic were briefly outlined and measures were recommended as to how these systems could be integrated into the respective sets of rules in terms of certification and monitoring.
The Federal Highway Research Institute has continued participation in the activities of the IHRA-ITS; a report on these activities will be provided separately as part of this conference. The development of a methodical instrument for evaluating the safety of various ITS systems has been commenced in cooperation with the Swedish National Road Administration. This project will concentrate on measurements of visual and mental stress.
From the point of view of automotive engineering and

behavioural sciences, the Federal Highway Research Institute is conducting its own research projects concerning driver assistance systems, and participating in a large number of international projects on a European platform (for instance, Advisors, Comunicar, Gadget and Vesuv).
Project VESUV is following two approaches to improve the traffic safety of unprotected road users as part of the project network titled "Safe Roads", initiated by the Federal Ministry of Education and Research. The first approach involves the development and testing of a new driver assistance system, which automatically identifies unprotected road users in the vicinity of a vehicle and duly informs the driver about them. To realize this objective, a cooperative venture has been formed between BMW, the Institute of Neuro-informatics at the Ruhr University of Bochum, C-Vis Computer Vision and Automation GmbH, the Institute for Automation and Communication at the Otto-von-Guericke-University of Magdeburg and the Federal Highway Research Institute. The tasks of the Federal Highway Research Institute as part of developing this new driver assistance system essentially cover three areas: (1) Identification and classification of possible encounters between car drivers and unprotected road users on the basis of relevant literature, accident statistics as well as video material obtained from research by the Federal Highway Research Institute, (2) Definition of safety requirements for the driver assistance system and (3) Testing of the safety provided by this system. The second approach followed in this project will investigate the extent to which unprotected road users accept measures and initiatives intended to protect them in road traffic. For instance, this can consist of colored or reflective items of clothing or a handy, electronic signal transmitter which automatically notifies all car drivers equipped with a corresponding receiver about the proximity of pedestrians and bicyclists. To investigate the acceptance of such technical solutions in detail, a representative survey is being conducted, for which the Federal Highway Research Institute has prepared a questionnaire.
A central objective of this project is to estimate the increase in safety achieved through active contributions by unprotected road users (for instance, wearing of electronic signal transmitters), (passive) detection of such users, as well as a combined effect of both measures. The basis for this is provided by an evaluation study, for which a measurement vehicle with the latest equipment is available. One goal here is to establish the extent to which the specified safety requirements are met, the technical system is accepted, and profitability (cost / benefit) is ensured.

Automotive Environmental Protection

Since 1999, the Federal Highway Research Institute has used the TREMOD data and computing model (Transport Emission Estimation Model) for calculating the emission levels and energy consumption of motorized traffic. This model can be used to determine the development of total emission by traffic in the Federal Republic of Germany for various scenarios up to the year 2020. Of significance is the fact that the model as well as the database are used and recognized by various state-owned and private institutions, thus leading to a high degree of acceptance of the results. So far, the Federal Highway Research Institute has used the data and computing model to deal with the following topics:

- The effects of tax relief for vehicles complying with emission stages EURO 3 and EURO 4 on emissions by passenger-car traffic
- The influence of the sulfur content of fuel on emissions by road traffic
- Decrease in emissions by a road traffic due to legally specified limiting values
- Development in the emission levels of freight traffic
- Potential for reducing CO_2 emissions in road traffic
- Determination of the emission levels of light commercial vehicles from the perspective of the ozone problem
- Effects of the voluntary, unilateral committment by automobile manufacturers on CO_2 emission levels
- Estimates of emissions by speed-limited, light motorcycles
- Evaluation of emission levels with respect to climate protection objectives

A new method of testing the conformity of operational vehicles in accordance with guideline 70/220/EEC in the version 98/69/EC of the European Parliament and Council dated October 13th, 1998 was introduced at the beginning of 2000. This method is intended to ensure that all the components of an emission-reduction system on a vehicle remain serviceable for at least five years or 80,000/100,000 kilometers, assuming proper operation and maintenance. Tests of the conformity of vehicles in use serve for environmental protection, and are considered an important instrument for minimizing the field emissions of exhaust gases.

Some of the motorcycles currently in use have the highest stretch-related pollutant emission levels of all vehicles. As opposed to passenger cars, in whose case a periodic exhaust-emission inspection is legally specified, motorcycles are no longer subject to any mandatory exhaust-emission inspections once they have been licensed for traffic. This also applies to

noise emissions.
In view of this, the enforcement of an environmental inspection for motorcycles is currently being considered. It is intended to be similar to the exhaust-emission inspection for passenger cars, and allow a detection of deviations in emission characteristics as well as manipulations resulting in increased noise emission levels. The basic requirements for a concept of regular monitoring of the exhaust-gas and noise characteristics of motorcycles in use in traffic are presently being discussed by the work committee designated "Environmental Inspections for Motorcycles" as well as two working groups. Operating by appointment to the work committee, the two working groups deal with the technical aspects of exhaust-emission inspections and noise-level inspections.
The environmental inspection for motorcycles is intended to be enforced before the end of this parliamentary term. European regulations concerning this aspect do not yet exist. Consequently, regulations in accordance with German law are to be prepared. The European Commission needs to be notified of such regulations. If the commission formulates its own set of required actions, the German recommendations might serve as a basis for a European legislation.

The UN-ECE group of experts designated "Exhaust Gas and Energy" (GRPE) is currently discussing the introduction of an internationally harmonized exhaust-gas certification cycle for motorcycles (worldwide motorcycle test cycle, WMTC). The new exhaust-gas certification cycle for motorcycles is intended to represent the operational conditions occurring in real traffic better than the presently valid ECE cycle. For this purpose, it is necessary to supplement the test guidelines with instructions on gear changing during acceleration and deceleration. Consequently, on behalf of the Federal Ministry of Traffic, Civil Engineering and Housing, the Federal Highway Research Institute awarded a research project whose objective is to formulate practical gear-changing instructions on the basis of data concerning driving behaviour under real circumstances. The gear-changing behaviour is to be defined so as to allow easy conversion into driving instructions.

To allow adherence to future emission limiting values for motor vehicles, increasing use is also being made of exhaust-gas post-treatment systems (for instance, particle-filter systems or NOx storage catalysts) which foresee the storage of limited pollutant components over a certain period of engine operation. The storage mechanisms and filters need to be regenerated periodically; the time of commencement of active or passive regeneration is not firmly specified, but dependent on a number of boundary conditions. The regenerative phase can influence pollutant emission levels and fuel consumption. Since the beginning of 2000, this topic has been on the agenda of the GRPE (Exhaust-Gas/Energy expert group of WP 29 – UN/ECE). Issues presently under discussion include a consideration of the regenerative processes in the type test cycle, the procedure for currently pending type tests (for example, Peugeot particle-filter system) as well as a possible necessity of adapting exhaust-gas regulations.
In the area of environmental protection, a reduction in road traffic noise levels has become an imperative requirement. To reduce the noise levels emitted by vehicle tyres, the EU commission is preparing a regulation which is currently in the legislative phase. To be able to specify suitable test methods, the Federal Highway Research Institute is participating in an international research group which is implementing a project titled "Tyre Grip" in order to obtain the findings necessary for formulating this legislative extension.

Rescue Systems

In recent years, Germany's rescue service has developed into a nationally and internationally recognized system.
According to continuous projections, 9.9 million rescue missions were carried out in 1998/1999, 59% of which are assignable to ambulance services (urgent and available) and 41% to emergency missions (with and without emergency doctors). In other words, every 9th citizen on average made use of the rescue service once in the course of the year. The number of emergency missions accompanied by an emergency doctor is steadily increasing: the proportion of emergency missions involving the presence of an emergency doctor rose from 32% in 1985 to 49% 15 years later. The response time, that is, the time between issue of the emergency message and the time between arrival of the first rescue facility at the site of the emergency amounts to 7.8 minutes on average. Approximately every 12th emergency mission (8%) was in response to a traffic accident. The number of responses to traffic accidents as a percentage of the total number of emergency missions has dropped continuously in the course of the years. Twenty years ago, this value was as high as 27.2%.

The reports by the German automobile industry are to be found in the various technical seminars.

In future, we will continue to make our contribution toward the development of this important conference on vehicle safety.